Your Starting a Mask Business

Given the pandemic, you set out to make face masks to sell to three stores. We can call these stores, 1, 2, and 3. You realize that the demand is a function of the price. The total demand across all three stores can be defined as D= 140\*1.00291^-P, where P is the current price. You decide that based on the time you are going to spend making these masks, you would like to charge the three stores $10 dollars per mask. Each store consumes a certain proportion of the total demand and it costs you delivery costs to deliver to each mostly in the form of gas money, packaging, and boxes. The following table contains this breakdown:

|  |  |  |  |
| --- | --- | --- | --- |
| Store | Store 1 | Store 2 | Store 3 |
| Delivery Costs | $3.00 | $5.00 | $2.00 |
| Distribution of Demand | 39% | 43% | 18% |

You have determined that using the electricity and other resources in your home it comes at a fixed cost of $140 dollars. In addition, the time you spend making each mask, and the materials and so forth result in a manufacturing cost of $5 dollars.

Develop a repeating sub-model spreadsheet for this situation. You would like the spreadsheet to have the following worksheets:

1. Data-Stores: should contain multi-valued data
2. Data: should contain only single valued data variables
3. Stores: Computations for all repeated computations, here you should compute
4. Model: should contain computations that are not repeated for each store
5. Interface: should contain the inputs and outputs for this model, which are emphasized below.

The following quantities should be determined: Total Profit across all stores, in addition, you would like to see the profit and the net profit margin by store. Net Profit Margin= Profit of Store/ Revenue of store. Present the Net Profit Margin as a percentage in the interface, which should also contain the price as input and net profit margin for each store and the total demand across all stores, and profit in dollars for each store.

In addition, answer the following questions:

1. At the price of 10 dollars what’s the net profit margin for each store?
2. Create a graphic that has the net profit margin for each store as it relates to a price. That is create a single plot, where the net profit margin is plotted for each store, and the x axis is the price changing from 9 dollars to 15 dollars incremented by .25 cents.
3. Create a similar graphic for the profit of each store versus the price incremented by .25 cents starting price is 9 and ending price is 15.
4. Given the graphic created in part 3, is there a price that allows any two stores to generate the same profit given that their demand distribution is different. This simply means do the lines intersect if so at what prices for what stores.